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Attorney Docket No.: **4100-194**

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UTILITY PATENT APPLICATION TRANSMITTAL

Submit an original and a duplicate for fee processing

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Assistant Commissioner for Patents
BOX PATENT APPLICATION
Washington, DC 20231

Dated: June 30, 2000

Sir:

Transmitted herewith for filing is the utility patent application of:

Inventor(s): Klaus T. REICHEL

For: A Printing Unit Cylinder For A Rotary Printing Machine

Enclosed are:

- Transmittal letter **(2x)** with Fee Computation Sheet
- General Authorization For Payment of Fees **(2x)**
- Title Page, Specification, Claims 1 to 12 & Abstract (11 pages)
- Unexecuted Declaration and Power of Attorney (2 p.)
- 1 sheet of drawings (Figs. 1 to 2)
- Check for **$ 690** for filing fee
- Return Receipt Postcard

[] Please charge my Deposit Account No. 03-2412 in the amount of $_. A duplicate copy of this sheet is enclosed.

[x] The Commissioner is hereby authorized to charge payment of the following fees associated with this application or credit any overpayment to Deposit Acct. No. 03-2412.

[x] Any additional filing fees required under 37 CFR 1.16.

[x] Any patent application processing fees under 37 CFR 1.17

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[x] The issue fee set in 37 CFR 1.18 at 3 months from mailing of the Notice of Allowance, pursuant to 37 CFR 1.311 (b) provided the fee has not already been paid by check.

[x] Any filing fees under 37 CFR 1.16 for presentation of extra claims.

[X] Priority is claimed for this invention and application, corresponding applications having been filed in **Germany** on **July 01, 1999**, No. **199 30 480.7**.

Respectfully submitted,
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APPLICATION FOR UNITED STATES LETTERS PATENT

A PRINTING UNIT CYLINDER FOR A ROTARY PRINTING MACHINE

Inventors:

Klaus T. REICHEL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a printing-unit cylinder for a rotary printing machine. More particularly, the present invention relates to a transfer cylinder, a plate cylinder or a back pressure cylinder. The present invention further relates to a barrel, a body and an entire printing unit cylinder for effectively dissipating undesired heat during the printing process.

2. Description of the Related Art

When using a transfer cylinder in a rotary printing machine, flexure work in the rubber blanket during rolling contact with a plate cylinder and a back-pressure cylinder produces dissipation energy and results in undesirable heating of the rubber blanket. EP 0 697 284.A1 suggests a solution to the problem by providing internal cooling. However, this internal cooling system is complex and can cause problems in both producing the system and in operating it.

DE 196 19 655 A1 suggests an improvement in heat transfer between the rubber blanket and the transfer cylinder bearing the blanket. It is proposed that the rubber blanket contain a heat-dissipating inlay or underlay designed to dissipate the heat radially to the transfer cylinder. However, in this system localized differences in heating of the blanket still occur. These local temperature differences can be caused by the subject or as a result of the blanket having variations in compressibility. These variations may be caused by a lack of a

homogenous blanket material. As a result, the differences in heating over the blanket are transmitted to the transfer cylinder which then has variations in temperature. Non-uniform heating of the transfer cylinder can in turn lead to deformation such as curvature of its longitudinal axis with resultant disruption of ink transfer. This impairs the printing quality.

Non-uniform heating as discussed may also occur on other printing-unit cylinders, for example plate cylinders. The same cylinder deformations and impairment to the printing quality can occur in this instance as well.

SUMMARY OF THE INVENTION

The object of the invention is to provide a printing-work cylinder which addresses the problems of the prior art.

A further object of the present invention is to provide a printing-work cylinder that is subject only to low deformation even under operating conditions which increase the temperature of the printing unit.

Briefly stated, the present invention is a printing unit cylinder for a rotary printing machine including a cylinder made of a metallic material having a linear coefficient of expansion of about $\alpha < 5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°.

According to an embodiment, a printing unit cylinder is made of a metallic material having a linear coefficient of expansion of about $\alpha < 1.5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°.

According to another embodiment of the present invention, a printing unit cylinder is made of an iron alloy having from about 30% to about 40% nickel by weight.

According to another embodiment of the present invention, a printing unit cylinder is made of an iron alloy having about 36% nickel by weight.

A cylinder for a rotary printing unit made according to the present invention will deform only slightly under conditions where regions of the cylinder are heated to a greater extent than other regions on the cylinder. The low coefficient of expansion results in the regions on the cylinder having the greater temperature expanding only slightly more as compared to the regions on the cylinder having a lower temperature. As a result, the minor

deformation of the cylinder has little to no influence on ink transfer and thus causes little to no impairment of the printing quality. As a result of this low bending of the transfer cylinder, during operation of the printing unit, the pressure on the rubber blanket increases only to an insignificant degree with the associated introduction of heat. As a result, deformation or bending of printing unit cylinders does not escalate.

Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. It should be further noted that the drawings are merely intended to conceptually illustrate the structures and procedures described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

In the associated drawings, in schematic form:

Fig. 1 shows a printing unit cylinder, which consists completely of a metallic material with a low coefficient of expansion; and

Fig. 2 shows a printing unit cylinder whose body consists of a metallic material with a low coefficient of expansion.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Fig. 1 shows a printing unit cylinder 1, made completely of a metallic material with a linear coefficient of expansion of $\alpha < 5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°. An embodiment of the present invention is a printing-unit cylinder 1 made from an iron alloy having 36% nickel by weight. The iron/nickel alloy proposed is described in "Nickel und Nickellegierungen" [Nickel and Nickel Alloys] by K.E. Volk, Springer-verlab Berlin, Heidelberg, New York, 1970, pages 27 to 39. Iron having this proportion of nickel has an average coefficient of expansion in the temperature range of from 0°C to 100°C of about $\alpha < 5 \times 10^{-6} K^{-1}$. This is approximately 10 to 20 times less than the conventional steel used for production of the cylinder. The proportion of nickel can lie in the range of between 30% and 40% by weight, while retaining an acceptable but higher coefficient of expansion. For adequate dimensional stability of the printing unit cylinder 1, the linear coefficient of expansion should lie below $5 \times 10^{-6} K^{-1}$.

Fig. 2 shows a printing unit cylinder 1.1 in which only the barrel 2 of the body of the cylinder is made from an iron/nickel alloy having a linear coefficient of expansion $\alpha < 5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°. The two journals 3, 4 are made from a less expensive steel and are screwed onto the body 2 of the cylinder at the ends. In this design as well, the printing unit cylinder 1.1 possesses good dimensional stability when non-uniform heating occurs during use.

The printing unit cylinders 1 and 1.1 described can be, for example, plate cylinders, transfer cylinders or back-pressure cylinders.

Thus, while there has been shown and described and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

CLAIMS

I claim:

1. A printing unit cylinder for a rotary printing machine, comprising a body made of a metallic material having a linear coefficient of expansion of about $\alpha < 5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°.

2. A printing unit cylinder for a rotary printing machine according to claim 1, wherein said metallic material has a linear coefficient of expansion of about $\alpha < 1.5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°.

3. The printing unit cylinder as claimed in claim 1, wherein said metallic material is an iron alloy having about 30% to about 40% nickel by weight.

4. The printing unit cylinder as claimed in claim 3, wherein said metallic material is an iron alloy having about 36% nickel by weight.

5. The printing unit cylinder according to claim 1, wherein the entire cylinder is made of said metallic material.

6. The printing unit cylinder according to claim 2, wherein the entire cylinder is made of said iron alloy.

7. The printing unit cylinder according to claim 3, wherein the entire cylinder is made of said iron alloy.

8. The printing unit cylinder according to claim 4, wherein the entire cylinder is made of said iron alloy.

9. The printing unit cylinder according to claim 1, wherein the body is made of a barrel as a central piece and two journals on either side of the barrel and only the barrel of said cylinder is made of said metallic material.

10. The printing unit cylinder according to claim 2, wherein the body is made of a barrel as a central piece and two journals on either side of the barrel and only the barrel of said cylinder is made of said metallic material.

11. The printing unit cylinder according to claim 3, wherein the body is made of a barrel as a central piece and two journals on either side of the barrel and only the barrel of said cylinder is made of said metallic material.

12. The printing unit cylinder according to claim 4, wherein the body is made of a barrel as a central piece and two journals on either side of the barrel and only the barrel of said cylinder is made of said metallic material.

ABSTRACT OF THE DISCLOSURE

A printing unit cylinder is subject to only low deformation in the event of operationally induced increases in the temperature of the printing unit. At least the barrel of the body of the printing unit cylinder is produced from a metallic material with a linear coefficient of expansion of $\alpha < 5 \times 10^{-6} K^{-1}$ in a temperature range of from about 20° to about 60°.

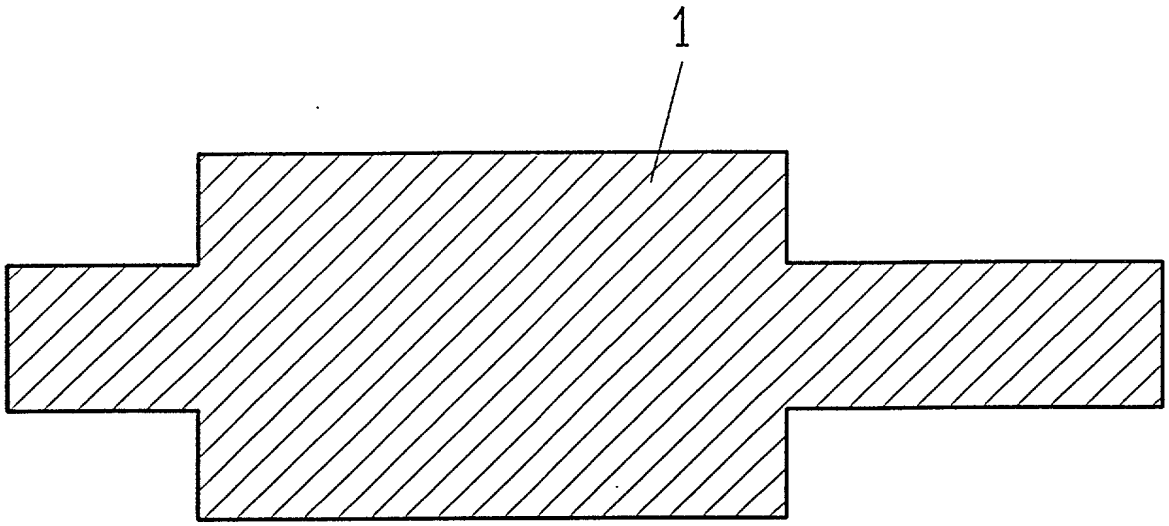

Fig. 1

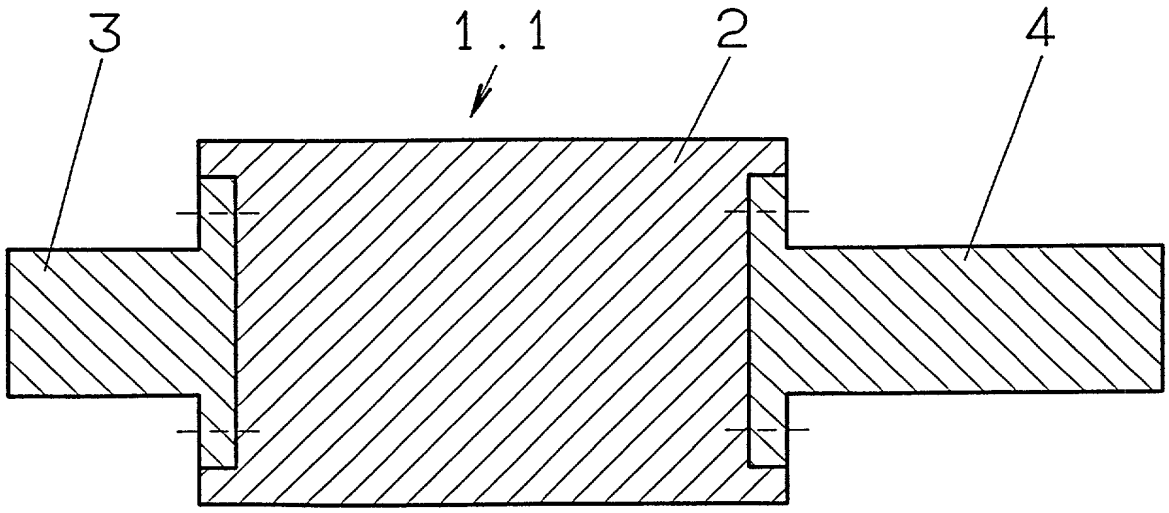

Fig. 2

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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A PRINTING UNIT CYLINDER FOR A ROTARY PRINTING MACHINE

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I also acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37 CFR 1.63(d), which occurred between the filing date of the prior application and the filing date of the continuation-in-part application, if this is a continuation-in-part application.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application:	**Country:**	**Germany**
	Appln. No.:	**199 30 480.7**
	Filed:	**July 01, 1999**

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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